
CHAPTER 8

PRESENT WEATHER

8.1 General

Present weather includes precipitation, obscurations, well-developed dust/sand whirls, squalls, tornadic activity, sandstorms, and duststorms. Present weather may be evaluated instrumentally, manually, or through a combination of instrumental and manual methods.

8.2 Scope

This chapter prescribes the standards for observing and reporting present weather. The types of present weather reported vary according to the type of station defined by the responsible agency.

8.3 Present Weather Parameters

8.3.1 Precipitation. Precipitation is any of the forms of water particles, whether liquid or solid, that fall from the atmosphere and reach the ground. The types of precipitation are:

- a. **Drizzle.** Fairly uniform precipitation composed exclusively of fine drops with diameters of less than 0.02 inch (0.5 mm) very close together. Drizzle appears to float while following air currents, although unlike fog droplets, it falls to the ground.
- b. **Rain.** Precipitation, either in the form of drops larger than 0.02 inch (0.5 mm), or smaller drops which, in contrast to drizzle, are widely separated.
- c. **Snow.** Precipitation of snow crystals, mostly branched in the form of six-pointed stars.
- d. **Snow Grains.** Precipitation of very small, white, and opaque grains of ice.
- e. **Ice Crystals (Diamond Dust).** A fall of unbranched (snow crystals are branched) ice crystals in the form of needles, columns, or plates.
- f. **Ice Pellets.** Precipitation of transparent or translucent pellets of ice, which are round or irregular, rarely conical, and which have a diameter of 0.2 inch (5 mm), or less. There are two main types:
 - (1) Hard grains of ice consisting of frozen raindrops, or largely melted and refrozen snowflakes.
 - (2) Pellets of snow encased in a thin layer of ice which have formed from the freezing, either of droplets intercepted by the pellets, or of water resulting from the partial melting of the pellets.
- g. **Hail.** Precipitation in the form of small balls or other pieces of ice falling separately or frozen together in irregular lumps.
- h. **Small Hail and/or Snow Pellets.** Precipitation of white, opaque grains of ice. The grains are round or sometimes conical. Diameters range from about 0.08 to 0.2 inch (2 to 5 mm).
- i. **Unknown Precipitation.** Precipitation type that is reported if the automated station detects the occurrence of precipitation but the precipitation discriminator cannot recognize the type.

8.3.2 Obscurations. Any phenomenon in the atmosphere, other than precipitation, that reduces the horizontal visibility.

- a. **Mist.** A visible aggregate of minute water particles suspended in the atmosphere that reduces visibility to less than 7 statute miles but greater than or equal to 5/8 statute miles.

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- b. **Fog.** A visible aggregate of minute water particles (droplets) which are based at the Earth's surface and reduces horizontal visibility to less than 5/8 statute mile and, unlike drizzle, it does not fall to the ground.
 - c. **Smoke.** A suspension in the air of small particles produced by combustion. A transition to haze may occur when smoke particles have traveled great distances (25 to 100 miles or more) and when the larger particles have settled out and the remaining particles have become widely scattered through the atmosphere.
 - d. **Volcanic Ash.** Fine particles of rock powder that originate from a volcano and that may remain suspended in the atmosphere for long periods.
 - e. **Widespread Dust.** Fine particles of earth or other matter raised or suspended in the air by the wind that may have occurred at or far away from the station which may restrict horizontal visibility.
 - f. **Sand.** Sand particles raised by the wind to a height sufficient to reduce horizontal visibility.
 - g. **Haze.** A suspension in the air of extremely small, dry particles invisible to the naked eye and sufficiently numerous to give the air an opalescent appearance.
 - h. **Spray.** An ensemble of water droplets torn by the wind from the surface of an extensive body of water, generally from the crests of waves, and carried up a short distance into the air.

8.3.3 Other Weather Phenomena

- a. **Well-developed Dust/Sand Whirl.** An ensemble of particles of dust or sand, sometimes accompanied by small litter, raised from the ground in the form of a whirling column of varying height with a small diameter and an approximately vertical axis.
- b. **Squall.** A strong wind characterized by a sudden onset in which the wind speed increases at least 16 knots and is sustained at 22 knots or more for at least one minute (see paragraph 12.6.8.e.(1)).
- c. **Funnel Cloud (Tornadic Activity)**
 - (1) **Tornado.** A violent, rotating column of air touching the ground.
 - (2) **Funnel Cloud.** A violent, rotating column of air which does not touch the surface.
 - (3) **Waterspout.** A violent, rotating column of air that forms over a body of water, and touches the water surface.
- d. **Sandstorm.** Particles of sand carried aloft by a strong wind. The sand particles are mostly confined to the lowest ten feet, and rarely rise more than fifty feet above the ground.
- e. **Duststorm.** A severe weather condition characterized by strong winds and dust-filled air over an extensive area.

8.4 Present Weather Observing Standards

8.4.1 Qualifiers. Present weather qualifiers fall into two categories: intensity or proximity and descriptors. Qualifiers may be used in various combinations to describe weather phenomena.

- a. **Intensity/Proximity.** The intensity qualifiers are: light, moderate, and heavy. The proximity qualifier is vicinity.

- (1) **Intensity of Precipitation.** When more than one form of precipitation is occurring at a time or precipitation is occurring with an obscuration, the intensities determined shall be no greater than that which would be determined if any forms were occurring alone.

The intensity of precipitation shall be identified as light, moderate, or heavy in accordance with one of the following:

- (a) **Intensity of Rain or Ice Pellets.** The intensity of rain and ice pellets shall be based on the criteria given in Table 8-1, Table 8-2, and Table 8-3.

Table 8-1. Intensity of Rain or Ice Pellets Based on Rate-of-Fall

Intensity	Criteria
Light	Up to 0.10 inch per hour; maximum 0.01 inch in 6 minutes.
Moderate	0.11 inch to 0.30 inch per hour; more than 0.01 inch to 0.03 inch in 6 minutes.
Heavy	More than 0.30 inch per hour; more than 0.03 inch in 6 minutes.

Table 8-2. Estimating Intensity of Rain

Intensity	Criteria
Light	From scattered drops that, regardless of duration, do not completely wet an exposed surface up to a condition where individual drops are easily seen.
Moderate	Individual drops are not clearly identifiable; spray is observable just above pavements and other hard surfaces.
Heavy	Rain seemingly falls in sheets; individual drops are not identifiable; heavy spray to height of several inches is observed over hard surfaces.

Table 8-3. Estimating Intensity of Ice Pellets

Intensity	Criteria
Light	Scattered pellets that do not completely cover an exposed surface regardless of duration. Visibility is not affected.
Moderate	Slow accumulation on ground. Visibility reduced by ice pellets to less than 7 statute miles.
Heavy	Rapid accumulation on ground. Visibility reduced by ice pellets to less than 3 statute miles.

- (b) **Intensity of Snow and Drizzle.** The intensity of snow and drizzle shall be based on the reported surface visibility in accordance with Table 8-4 when occurring alone.

Table 8-4. Intensity of Snow or Drizzle Based on Visibility

Intensity	Criteria
Light	Visibility > 1/2 mile.
Moderate	Visibility > 1/4 mile but ≤ 1/2 mile.
Heavy	Visibility ≤ 1/4 mile.

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- (2) **Proximity.** Unless otherwise directed elsewhere in this Handbook, weather phenomena occurring beyond the point of observation (between 5 and 10 statute miles) shall be reported as (in the) vicinity.

b. **Descriptors.** Descriptors are qualifiers which further amplify weather phenomena and are used with certain types of precipitation and obscurations. The descriptor qualifiers are: shallow, partial, patches, low drifting, blowing, shower(s), thunderstorm, and freezing.

- (1) **Shallow.** The descriptor shallow shall only be used to further describe fog that has little vertical extent (less than 6 feet).
- (2) **Partial and Patches.** The descriptors partial and patches shall only be used to further describe fog that has little vertical extent (normally greater than or equal to 6 feet but less than 20 feet), and reduces horizontal visibility, but to a lesser extent vertically. The stars may often be seen by night and the sun by day.
- (3) **Low Drifting.** When dust, sand, or snow is raised by the wind to less than 6 feet, "low drifting" shall be used to further describe the weather phenomenon.
- (4) **Blowing.** When dust, sand, snow, and/or spray is raised by the wind to a height of 6 feet or more, "blowing" shall be used to further describe the weather phenomenon.
- (5) **Shower(s).** Precipitation characterized by the suddenness with which they start and stop, by the rapid changes of intensity, and usually by rapid changes in the appearance of the sky.
- (6) **Thunderstorm.** A local storm produced by a cumulonimbus cloud that is accompanied by lightning and/or thunder.
- (7) **Freezing.** When fog is occurring and the temperature is below 0°C, "freezing" shall be used to further describe the phenomena. When drizzle and/or rain freezes upon impact and forms a glaze on the ground or other exposed objects, "freezing" shall be used to further describe the precipitation.

8.4.2 Weather Phenomena. Weather phenomena fall into three categories: precipitation, obscurations, and other phenomena. The three categories of weather phenomena shall be combined with the qualifiers listed in the preceding paragraphs, to identify present weather that is occurring.

8.5 Present Weather Reporting Standards

Present weather is reported when it is occurring at, or in the vicinity of, the station and at the time of observation. Unless directed elsewhere in the Handbook, the location of weather phenomena shall be reported as:

- ◆ "occurring at the station" when within 5 statute miles of the point(s) of observation.
- ◆ "in the vicinity of the station" when between 5 and 10 statute miles of the point(s) of observation.
- ◆ "distant from the station" when beyond 10 statute miles of the point(s) of observation.

With the exception of volcanic ash, low drifting dust, low drifting sand, low drifting snow, shallow fog, partial fog, and patches (of) fog, obscurations are reported only when the prevailing visibility is less than 7 statute miles or considered operationally significant. Volcanic ash shall always be reported when observed.

When more than one type of present weather are reported at the same time, present weather shall be reported in the following order:

- ◆ Tornadic activity--Tornado, Funnel Cloud, or Waterspout.
- ◆ Thunderstorm(s) with or without associated precipitation.
- ◆ Present weather in order of decreasing dominance, i.e., the most dominant type is reported first.
- ◆ Left-to-right in Table 8-5 (Columns 1 through 5).

The reporting notations given in Table 8-5 shall be used to report present weather. (For definitions of present weather, refer to Appendix A - Glossary).

8.5.1 Precipitation. Precipitation shall be reported when occurring at the point of observation. Precipitation not occurring at the point of observation but within 10 statute miles shall be reported as showers in the vicinity.

a. Liquid Precipitation

- (1) **Drizzle.** (see paragraphs 12.6.8.a(1), 12.6.8.c(1), and 12.7.1.k).
- (2) **Rain.** (see paragraphs 12.6.8.a(1), 12.6.8.c(1), and 12.7.1.k).
- (3) **Rainshower(s).** (see paragraphs 12.6.8.a(1), 12.6.8.b(3), 12.6.8.c(1), and 12.7.1.k).

b. Freezing Precipitation

- (1) **Freezing Rain.** (see paragraphs 12.6.8.a(1), 12.6.8.b(5), 12.6.8.c(1), 12.7.1.k).
- (2) **Freezing Drizzle.** (see paragraphs 12.6.8.a(1), 12.6.8.b(5), 12.6.8.c(1), and 12.7.1.k).

c. Solid Precipitation

- (1) **Snow.** (see paragraphs 12.6.8.a(1), 12.6.8.c(1), 12.7.1.k).
- (2) **Snowshower(s).** (see paragraphs 12.6.8.a(1), 12.6.8.b(3), 12.6.8.c(1), and 12.7.1.k).
- (3) **Blowing Snow.** (see paragraphs 12.6.8.a(1), 12.6.8.b(2), and 12.6.8.c(1)).
- (4) **Low Drifting Snow.** (see paragraphs 12.6.8.a(1), 12.6.8.b(2), and 12.6.8.c(1)).
- (5) **Snow Grains.** (see paragraphs 12.6.8.a(1), 12.6.8.c(1), 12.7.1.k).
- (6) **Ice Crystals.** (see paragraphs 12.6.8.a(1), 12.6.8.c(1), and 12.7.1.k).
- (7) **Ice Pellets.** (see paragraphs 12.6.8.c(1) and 12.7.1.k).
Ice Pellet shower(s). (see paragraphs 12.6.8.b(3), 12.6.8.c(1), and 12.7.1.k).
- (8) **Hail.** Hail shall be reported, at designated stations. (see paragraph 12.7.1.k and 12.7.1.n).
Hail shower(s). (see paragraphs 12.6.8.b(3), 12.6.8.c(1), 12.7.1.k, and 12.7.1.n).
- (9) **Small Hail and/or Snow Pellets.** (see paragraphs 12.6.8.c(1)).
Small Hail and/or Snow Pellets Shower(s). (see paragraphs 12.6.8.b(3), 12.6.8.c(1), and 12.7.1.n).

d. Unknown Precipitation. Unknown precipitation shall only be reported by automated stations to indicate precipitation of unknown type when the automated system cannot identify the precipitation with any greater precision (see paragraph 12.6.8.c(2)).

Table 8-5. Notations for Reporting Present Weather¹

QUALIFIER		WEATHER PHENOMENA		
INTENSITY OR PROXIMITY 1	DESCRIPTOR 2	PRECIPITATION 3	OBSCURATION 4	OTHER 5
- Light	MI Shallow	DZ Drizzle	BR Mist	PO Well-Developed Dust/Sand Whirls
Moderate ²	PR Partial	RA Rain	FG Fog	SQ Squalls
+ Heavy	BC Patches	SN Snow	FU Smoke	FC Funnel Cloud Tornado Waterspout ⁴
VC In the Vicinity ³	DR Low Drifting	SG Snow Grains	VA Volcanic Ash	SS Sandstorm
	BL Blowing	IC Ice Crystals	DU Widespread Dust	DS Duststorm
	SH Shower(s)	PL Ice Pellets	SA Sand	
	TS Thunderstorm	GR Hail	HZ Haze	
	FZ Freezing	GS Small Hail and/or Snow Pellets	PY Spray	
		UP Unknown Precipitation		

1. The weather groups shall be constructed by considering columns 1 to 5 in the table above in sequence, i.e., intensity, followed by description, followed by weather phenomena, e.g., heavy rain shower(s) is coded as +SHRA
 2. To denote moderate intensity no entry or symbol is used.
 3. See paragraph 8.4.1.a.(2), 8.5, and 8.5.1 for vicinity definitions.
 4. Tornadoes and waterspouts shall be coded as +FC.

8.5.2 Obscuration.

- a. **Mist.** (see paragraph 12.6.8.d(1)).
- b. **Fog.** (see paragraphs 12.6.8.a(2) and 12.6.8.d(1)).
 - (1) **Shallow (Ground) Fog.** (see paragraphs 12.6.8.b(1) and 12.6.8.d(1)).
 - (2) **Partial Fog.** (see paragraphs 12.6.8.b(1) and 12.6.8.d(2)).
 - (3) **Patches (of) Fog.** (see paragraphs 12.6.8.b(1) and 12.6.8.d(2)).
 - (4) **Freezing Fog.** (see paragraph 12.6.8.b(5) and 12.6.8.d(1)).
- c. **Smoke.** (see paragraph 12.6.8.d(1)).
- d. **Volcanic Ash.** (see paragraph 12.6.8.d(1)).
- e. **Widespread Dust.** (see paragraph 12.6.8.d(1)).
 - (1) **Blowing Dust.** (see paragraphs 12.6.8.a(1), 12.6.8.a(2), 12.6.8.b(2), and 12.6.8.d(1)).
 - (2) **Low Drifting Dust.** (see paragraphs 12.6.8.b(2) and 12.6.8.d(1)).

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- f. **Sand.** (see paragraph 12.6.8.d(1)).
 - (1) **Blowing Sand.** (see paragraphs 12.6.8.a(1), 12.6.8.a(2), 12.6.8.b(2), and 12.6.8.d(1)).
 - (2) **Low Drifting Sand.** (see paragraphs 12.6.8.b(2) and 12.6.8.d(1)).
 - g. **Haze.** (see paragraph 12.6.8.d(1)).
 - h. **Blowing Spray.** (see paragraphs 12.6.8.b(2) and 12.6.8.d(3)).

8.5.3 Other Weather Phenomena

- a. **Well-Developed Dust/Sand Whirls.** (see paragraphs 12.6.8.a(2) and 12.6.8.e(1)).
- b. **Squalls.** (see paragraph 12.6.8.e(1)).
- c. **Tornado, Waterspout, or Funnel Cloud.** (see paragraphs 12.6.8.a(1), 12.6.8.e(2), and 12.7.1.b).
- d. **Sandstorm.** (see paragraphs 12.6.8.a(1) and 12.6.8.e(1)).
- e. **Duststorm.** (see paragraphs (12.6.8.a(1) and 12.6.8.e(1)).

8.5.4 Thunderstorm. A thunderstorm occurring with or without accompanying precipitation shall be reported when observed to begin, to be in progress, or to end. In addition to reporting a thunderstorm in the body of the METAR/SPECI, remarks may be added to report the time, location, and movement of the storm (see paragraphs 8.5.5.c, 12.7.1.1, and 12.7.1.m).

- a. **Beginning of Thunderstorm.** The beginning of a thunderstorm shall be reported as the earliest time:
 - (1) thunder is heard;
 - (2) lightning is observed at the station when the local noise level is sufficient to prevent hearing thunder; or
 - (3) lightning is detected by an automated sensor.
- b. **Ending of Thunderstorm.** The ending of a thunderstorm shall be reported as 15 minutes after the last occurrence of any of the above criteria.

8.5.5 Beginning/Ending Times of Precipitation, Tornadic Activity, and Thunderstorms.

- a. **Precipitation.** At designated stations, the time precipitation begins or ends shall be reported to the nearest minute. The beginning and ending times shall be reported in the next METAR after the event. Beginning and ending times for separate periods shall be reported only if the intervening time exceeds 15 minutes (see paragraph 12.7.1.k).
- b. **Tornadic Activity.** At designated stations, the time tornadic activity begins or ends shall be reported to the nearest minute. The beginning and ending times shall be reported in a SPECI and the next METAR after the event (see paragraphs 12.6.8.e(2) and 12.7.1.b).
- c. **Thunderstorm.** At designated stations, the time thunderstorm(s) begins or ends shall be reported to the nearest minute. The beginning and ending times shall be reported in a SPECI and the next METAR after the event. Beginning and ending times of separate thunderstorm(s) shall be reported only in a METAR if the intervening time exceeds 15 minutes (see paragraphs 12.6.8.a(1), 12.7.1.1, and 12.7.1.m).

8.5.6 Other Significant Weather Phenomena. Observers shall be alert to weather phenomena that are visible from the station but not occurring at the station. Examples of such phenomena are fog banks, localized rain, snow blowing over runways, etc. These phenomena shall be reported whenever they are considered to be operationally significant. Volcanic eruptions shall be reported in remarks (see paragraph 12.7.1.a).

8.6 Summary of Weather. Table 8-6 contains a summary of the present weather observing and reporting standards according to the type of station.

Table 8-6. Summary of Present Weather Observing and Reporting Standards

Present Weather	Type of Station	
	Automated	Manual
Funnel Cloud (Tornadic Activity)	Augmented at designated stations.	Report FC, or +FC, and in remarks TORNADO, FUNNEL CLOUD, WATERSPOUT, time of beginning and time of ending, source, location, and direction of movement.
Thunderstorms	Augmented at designated stations.	Report TS, time of beginning/ending, location, and movement.
Hail	Augmented at designated stations	Report GR, time of beginning and time of ending, estimated size of largest hailstone in inches preceded by "GR".
Small hail and/or snow pellets	Augmented at designated stations.	Report GS, time of beginning and time of ending.
Obscurations	BR, FG and HZ may be reported.	Report BR, FG, PRFG, FU, DU, HZ, SA, BLSN, BLSA, BLDU, SS, DS, BLPY, and VA.
	N/A	Reports non-uniform weather and obscurations.
Precipitation	DZ, RA, SN, and UP may be reported.	Report RA, SHRA, DZ, FZRA, FZDZ, SN, SHSN, SG, GS, IC, GR, PL, and SHPL.
	May be reported as FZ.	Reports descriptor with precipitation.
	May report the intensity of precipitation as light, moderate, or heavy.	Reports the intensity of precipitation, other than IC, GR, and GS as light, moderate, or heavy.
	May report hourly accumulation of liquid precipitation.	May report hourly accumulation of liquid precipitation.
	May report 3-, 6-, and 24-hour accumulation of precipitation (water equivalent of solid).	May report 3-, 6-, and 24-hour accumulation of precipitation (water equivalent of solid).
	N/A	May report depth and accumulation of solid precipitation.
	N/A	Reports size of GR.
Squall	Report SQ.	Report SQ.